

WHAT IS CLAIMED IS:

1. A superconducting article, comprising:
a substrate having a first surface and a second surface opposite the first surface, the substrate including a plurality of indicia provided on the first surface spaced apart along a length of the substrate; and
a superconductor layer overlying the second surface.
2. The superconductor article of claim 1, wherein the article is a superconducting tape.
3. The superconducting article of claim 2, wherein the substrate has an aspect ratio of not less than 10^3 .
4. The superconducting article of claim 2, wherein the substrate has an aspect ratio of not less than 10^4 .
5. The superconducting article of claim 1, wherein the indicia are spaced apart along the substrate at a generally constant interval.
6. The superconducting article of claim 1, wherein the indicia are spaced apart along the substrate at a constant interval along substantially the entire length of the substrate.
7. The superconducting article of claim 1, wherein the indicia are present only along the first surface, and do not extend into the second surface.
8. The superconducting article of claim 1, wherein the indicia are made by at least one process from the group consisting of: laser scribing, mechanical etching, chemical etching, ink printing, plasma etching, or ion beam etching.
9. The superconducting article of claim 1, wherein the indicia are made by a material subtractive process such that the indicia comprise recesses in the first surface.

10. The superconducting article of claim 1, wherein each indicia comprises an indicia set, each indicia set including position identifier.

11. The superconducting article of claim 10, wherein the position identifier comprises a bar code.

12. The superconducting article of claim 10, wherein the position identifier includes a 2-dimensional pattern.

13. The superconducting article of claim 10, wherein the position identifier comprises an alphanumeric code.

14. The superconducting article of claim 10, wherein each position identifier along the substrate is unique.

15. The superconducting article of claim 10, wherein each indicia set further includes a fiducial for positioning the article.

16. The superconducting article of claim 15, wherein the fiducial is adapted for detection by an optical imaging system.

17. The superconducting article of claim 16, wherein the fiducial comprises a marking consisting of at least one of the following shapes: a star, concentric circles, and a crosshair.

18. The superconducting article of claim 10, wherein each indicia set further includes a lot identifier.

19. The superconducting article of claim 18, wherein the lot identifier includes manufacturing or processing date data.

20. The superconducting article of claim 1, wherein the superconductor layer comprises a high temperature superconductor material, having a critical temperature T_c not less than about 77 K

21. The superconducting article of claim 1, wherein the superconductor material comprises $\text{REBa}_2\text{Cu}_3\text{O}_{7-x}$, wherein RE is a rare earth element.

22. The superconducting article of claim 21, wherein the superconductor material comprises $\text{YBa}_2\text{Cu}_3\text{O}_7$.

23. The superconducting article of claim 1, further comprising a buffer layer provided between the superconductor layer and the substrate.

24. The superconductor article of claim 23, wherein the buffer layer includes at least one buffer film, the buffer film comprising a biaxially textured material having generally aligned crystals both in-plane and out-of-plane of the film.

25. The superconducting article of claim 1, further comprising a noble metal layer overlying the superconductor layer.

26. The superconducting article of claim 25, wherein the noble metal layer comprises silver.

27. The superconducting article of claim 1, further comprising a buffer layer provided between the substrate and the superconductor layer.

28. The superconducting article of claim 1, wherein the article is a power device comprising a superconductive tape, the superconductive tape comprising said substrate and said superconductive layer.

29. The superconducting article of claim 28, wherein the power device is a power cable, said power cable comprising a plurality of superconductive tapes.

30. The superconducting article of claim 29, further comprising a conduit for passage of coolant fluid.

31. The superconducting article of claim 30, wherein the superconductive tapes are wrapped around the conduit.

32. The superconducting article of claim 29, wherein the power cable comprises a power transmission cable.

33. The superconducting article of claim 29, wherein the power cable comprises a power distribution cable.

34. The superconducting article of claim 28, wherein the power device is a power transformer, the power transformer comprising a primary winding and a secondary winding, wherein at least one of the primary winding and secondary winding is comprised of said superconductive tape.

35. The superconducting article of claim 34, wherein the secondary winding has a fewer number of windings than the primary winding, for reducing voltage.

36. The superconducting article of claim 34, wherein the primary winding has a fewer number of windings than the secondary winding, for increasing voltage.

37. The superconducting article of claim 28, wherein the power device is a power generator, the power generator comprising a shaft coupled to a rotor comprising electromagnets containing rotor coils, and a stator comprising a conductive winding surrounding the rotor, wherein at least one of the winding and the rotor coils comprises said superconductive tape.

38. A power grid, comprising:

a power generation station comprising a power generator;

a transmission substation comprising a plurality of power transformers for receiving power from the power generation station and stepping-up voltage for transmission;

a plurality of power transmission cables for transmitting power from the transmission substation;

a power substation for receiving power from the power transmission cables, the power substation comprising a plurality of power transformers for stepping-down voltage for distribution; and

a plurality of power distribution cables for distributing power to end users, wherein

at least one of the power distribution cables, power transmission cables, transformers of the power substation, transformers of the transmission substation, and the power generator comprises a plurality of superconductive tapes each superconductive tape comprising a substrate having a first surface and a second surface opposite the first surface, the substrate including a plurality of indicia provided on the first surface spaced apart along a length of the substrate; and a superconductor layer overlying the second surface.

39. A method of manufacturing a superconductive tape, comprising:

providing a substrate having a first surface and a second surface opposite the first surface, the substrate including a plurality of indicia provided on the first surface spaced apart along a length of the substrate;

subjecting the substrate to multiple processing operations, including providing a superconductor layer to overlie the second surface; and

inspecting the superconductive tape based on the indicia.

40. The method of manufacturing a superconductive tape of claim 39, wherein inspecting comprises inspecting the superconductor tape at a specific location based on a specific indicia of the plurality of indicia, the specific indicia including an indicia set containing a position identifier and a fiducial.

41. The method of manufacturing a superconductive tape of claim 40, wherein inspecting is carried out during a manufacturing process.

42. The method of manufacturing a superconductive tape of claim 40, wherein inspecting is carried out by and end user, after completion of manufacturing processes.

43. The method of manufacturing a superconductive tape of claim 40, further comprising re-inspecting the superconductor tape at said specific location following a processing operation.

44. A method of laying power cable, comprising:
providing a coil of power cable, the power cable comprising a plurality of superconductive tapes, each tape comprising a substrate having a first surface and a second surface opposite the first surface, the substrate including a plurality of indicia provided on the first surface spaced apart along a length of the substrate; and a superconductor layer overlying the second surface; and
unwinding the coil while inserting the power cable into a conduit, wherein the conduit is an underground utility conduit.